

VINYL CHLORIDE FACT SHEET

September 1999

A fact sheet providing information on vinyl chloride in the environment

The purpose of this fact sheet is to provide information on the physical and chemical properties, and health effects of vinyl chloride. Also discussed are the ways in which vinyl chloride came to be present in the shallow groundwater at Kelly Air Force Base (AFB).

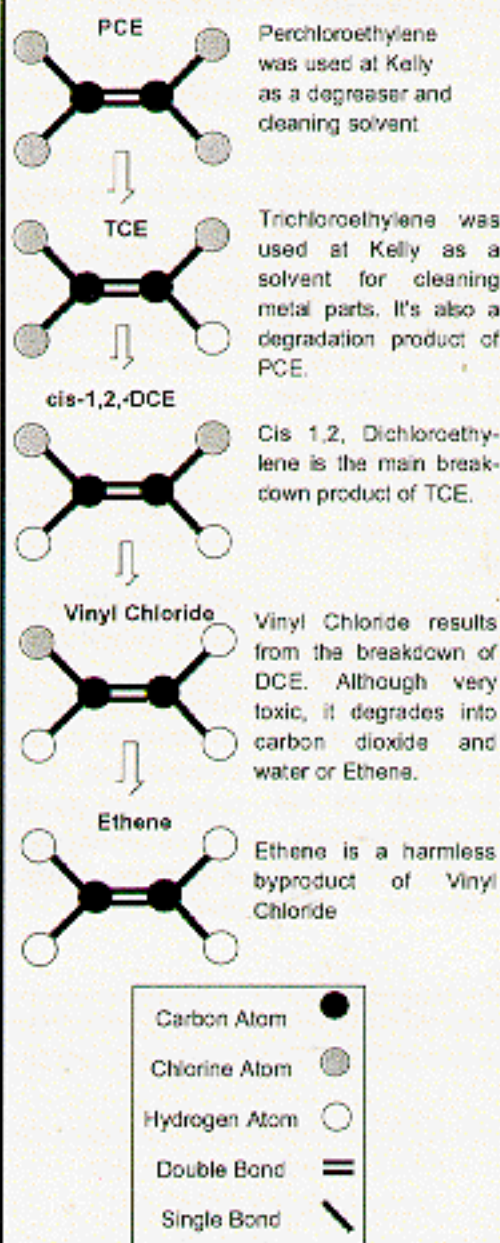
BACKGROUND

For years, Perchloroethylene, (PCE) and Trichloroethylene, (TCE) were considered relatively harmless to the environment and were used extensively as cleaning agents or solvents in industries such as electronics, textiles, food-processing and rubber, and even for medical applications. As a result of past understanding and use of PCE and TCE, these chemicals are now a frequent cause of contamination and sources of vinyl chloride in soil and groundwater.

Vinyl chloride is a man-made chemical compound used commonly in the plastics industry for such items as automobile parts and interiors, electrical wiring insulation and the white plastic PVC piping used in residential plumbing. It is a colorless gas at room temperature, although in industry, it is usually handled as liquid under pressure.

Vinyl chloride usually enters the environment from factories that release it into the air or dispose of wastes containing it into rivers and lakes, or from seepage into underground water in areas where chemical wastes containing it are stored. Sometimes, however, vinyl chloride is found only as a natural degradation product of PCE and TCE. Vinyl chloride itself breaks down gradually into less harmful products such as ethene or water and carbon dioxide.

Breakdown of PCE



HOW DID IT GET IN THE SHALLOW GROUNDWATER?

Although vinyl chloride was not used in any industrial processes at Kelly, it is found in the shallow groundwater as a breakdown product of PCE and TCE, which were used as cleaners, degreasing agents and solvents in shops on East Kelly and the main base. Along with Dichloroethylene (DCE), an intermediate breakdown product of TCE, vinyl chloride is found in low concentrations in some parts of the contamination plume emanating from parts of Kelly AFB.

The shallow groundwater, a water-bearing layer found between 15 and 25 feet below ground surface, is not used as a drinking water source and is separated from the Edwards Aquifer, a source of drinking water, by 800 to 1,000 feet of impermeable clay and limestone.

HOW MIGHT I BE EXPOSED TO VINYL CHLORIDE?

No pathway is known to exist for people to come in contact with vinyl chloride in the shallow groundwater in the Kelly AFB area. As already mentioned, the shallow groundwater is not used as a drinking water source, and known wells have been capped or accounted for.

Even if the shallow ground-water near East Kelly were used for washing and bathing, most of the vinyl chloride that might be present probably would evaporate rapidly. It is unlikely that vinyl chloride would build up in any fruits or vegetables that people might eat, according to a Public Health Statement on Vinyl Chloride released by the Agency for Toxic Substances and Disease Registry (ATSDR).

In some parts of the country near factories using vinyl chloride, breathing the air is the most likely avenue of exposure for most people. In the Kelly area, however, the vinyl chloride dissolved in the shallow groundwater is buried under 15 to 20 feet of hard-packed earth. No vinyl chloride vapors have seeped up to be detected on the surface, and none have been found in the air in South San Antonio.

Absorption of vinyl chloride through the skin is not likely to be an important pathway. Contact with undiluted vinyl chloride in a factory would likely result in absorption through the skin of only negligible amounts, according to the ATSDR.

HOW CAN VINYL CHLORIDE AFFECT MY HEALTH?

Vinyl chloride is widely considered a known cause of cancer in humans. This is based on numerous studies done at factories where workers came into direct contact at high levels over many years and based on testing of laboratory animals.

An increased risk of developing cancer of the liver and possibly several other organs has been linked with breathing air in factories, where the levels of vinyl chloride are usually more than a thousand times higher than levels found in the outdoor environment.

Studies designed to determine the effects of the low levels of vinyl chloride measured in outside air, drinking water, or food have not been done, according to the ATSDR and therefore, are not as reliable.

WHAT LEVELS OF EXPOSURE ARE HARMFUL?

Many non-specific factors determine whether a person will be harmed by an exposure to a chemical. Among the most important are the amount to which one was exposed, the length of exposure, and means of exposure. Other factors include the person's age, sex, diet, family traits, lifestyle, state of health, and exposure to other chemicals.

Even without being exposed to vinyl chloride, about 33 percent of the general population over a lifetime will experience some form of cancer (background cancer rate). That means about 3,300 people out of every 10,000 will get some form of cancer. If that same population is exposed to a concentration of approximately one part of vinyl chloride per billion (1 ppb) in air over a lifetime, there may be a slight increase in the number of cancer cases in that population.

Similarly, if a person is exposed to vinyl chloride in water at a concentration of approximately 2 parts per billion (2 ppb) over a lifetime, there is an increased chance of getting cancer above the expected background rates.

FEDERAL ENVIRONMENTAL STANDARDS

Federal agencies have set standards for the maximum levels allowable for chemicals such as vinyl chloride. Below those levels, air, drinking water and food are considered safe.

Air - EPA has set an emission standard of 10 parts per million (ppm) for vinyl chloride.

Water - The EPA maximum contaminant level for vinyl chloride in drinking water is 2 ppb (2 ug/L).

Food - The Food and Drug Administration (FDA) limits the content of vinyl chloride polymer in plastic food packaging to a range from 5 to 50 ppm, depending on the nature of the polymer and its use.

GLOSSARY

Parts per million (ppm): a measure of concentration. One ppm is comparable to one minute in two years.

Parts per billion (ppb): a measure of concentration. One ppb is comparable to one second in 32 years.

Concentration: The measure of the amount of a contaminant in soil, air or groundwater is called its concentration. Depending on the agency or professional organization, concentration is often measured in parts per million (ppm), equivalent to milligrams per liter (mg/L); or parts per billion (ppb), equivalent to micrograms per liter (ug/L).

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